

To: Brogden, Rose[Brogden.Rose@epa.gov]
Cc: R8EISC[R8EISC@epa.gov]
From: George Frambo
Sent: Tue 8/18/2015 9:00:57 AM
Subject: Gold King Mine Emergency Response (R8EISC)

Dear Brogden:

This is a follow up to our response to the Gold King Mine emergency response of August 2015.

We seek to partner with EPA to assist in achieving financial and environmental sustainability goals through the treatment of mining wastewater and resource recovery and reuse. The wastewater treatment process yields is cleaned through our chemical-free system that is customized to EPA standards ranging from irrigation to industrial water.

We are a solution based company offering an innovative state of the art technology which treat a wide range of wastewater with high solids (up to 50%) without the need for pre-filtration or staging. Also the concerns about periodic backwashing and frequent filter changes are eliminated.

Our system can be tuned as needed to generate a wide spectrum of purity depending on recycled water usage. It also is capable of removing heavy metals such as arsenic, selenium and others from wastewater streams.

Our system exceeds the demand for treating high solids multi-contaminant waste streams such as mine wastewater, raw sewage, industrial wastewater, landfill leachate, digestates, or livestock wastes in a single pass.

No chemicals are used and the concentrated solids can be processed in a variety of environmentally sustainable methods. Up to 99% of the water from most wastewater streams can be recovered for reuse or returned to the environment.

By reducing the treatment time and cost associated with many applications, our system simply cleans wastewater for reuse with minimal space and site requirements.

Benefits:

- Cost Savings; cleaning wastewater for re-use, reducing wastewater volume, minimizing /eliminating off-site or on-site treatment.

Value:

- Capturing specific valuable materials in waste stream for use/reuse elsewhere, ability to reduce fresh water intake, save on hydraulic and strength charges.

Overall Reduction:

- Reduction in treatment time and cost for many applications, physical space reduction (compared to traditional systems), reduction in need and size of on-site ponds/lagoons.

Less Pollution:

- Totally enclosed system. No air emission of pollutants into the environment and communities, no risk of catastrophic spills or release to the environment.

Flexibility:

- Zoning; it is zoned in residential, industrial, or commercial areas,. System can produce effluent with different purity levels while treating waste streams with high variability.

Weather independent:

- No need for temperature controls to support biological activities such as nitrification/denitrification or bio-metabolizing.

Ease of Permits:

- Often no need for construction permitting (no excavation or building construction necessary). May not require environmental impact studies or reviews.

Aesthetically pleasing:

- No large tanks, or sludge processing equipment required. No lagoons or clarifiers etc., no noise or odor nuisance.

Sampling and Analysis:

- Under the guidance of Minnesota Pollution Control Agency (MPCA) and a parametric engineering study was conducted for raw leachate.

Results Highlights:

- Removal of PFCs, Chlorides, Boron, VOCs
- Emerging contaminants of concerns such as PFC, Boron, and Chlorides...
- Physical indicator such as, BOD, COD, TSS, TDS, TS, Conductivity, PH...
- Chemical analysis of common contaminant such as P, N, Nox, NHs, chlorides, sulfates, Bromides.

- Metals assay including ICP metals such as Cd, Cr, Cu, Pb, Se, and Sb...
- Volatile Organic Compounds such as TCE, DCE, MEK...
- Biological Assay such as Fecal Coliform and E-Coli bacteria.

Results:

Amount of contaminants in raw leachate, treated effluent... and removal percentage.

Metalloids Removal %:

- Arsenic - ND, Selenium - ND, Boron - 89.47%, Phosphorus - 100.00%.

Metals Removal %:

- Chromium - 100.00%, Barium - 96.80%, Cadmium - ND, Cobalt - 100.00%, Copper - ND, Cyanide - 50.30%, Lead - ND, Mercury - ND, Molybdenum - ND, Nickel - 100.00%, Silver - ND and Zinc - 100.00%.

Other sample wastewater streams performed utilizing our solution were as follows:

Brewery:

Contaminants of concern: BOD, TSS, N, Turbidity

Initial level: BOD (42000), TSS (8500), N (120), Turbidity (4890) NTU

Desired level: BOD (<400), TSS (<50), N (10), Turbidity (<1) NTU

Achieved level: BOD (78), TSS (0), N (2), Turbidity (0.07) NTU

Metal Plating Company:

Contaminants of concern: ICP Metals, Metalloids, TSS, Turbidity

Initial level: TSS (162), Turbidity (250) & 450 NTU), Cr (100,000), Cu (61.3), Pb (18.9), Ni (47.8), Zn (133,000)

Desired level: TSS (<50), Turbidity (<1) Cr (<1000), Cu (10), Pb (<10), Ni (<10), Zn (<5,000)

Achieved level: TSS (0), Turbidity (0.02), Cr (200), Cu (0), Pb (0), Ni (0), Zn (<200)

Pulp & Paper Industry:

Contaminants of concern: BOD, TDS, TSS, COD, Turbidity

Initial level: BOD (2380), TSS (4350), COD (2980), Turbidity (4270)

Desired level: BOD (<400), TDS (<1000), TSS (<300), COD (<1000), Turbidity (<1) NTU

Achieved level: BOD (58.7), TDS (327), TSS (0), COD (125), Turbidity (0.09) NTU

Industrial:

Contaminants of Concern: Selenium

Initial level: >20 ppm

Desired level: 1 ppm

Achieved level: 0.05 ppm

Hospitality:

Contaminants of concern: Chlorides from laundry), TDS, TSS, COD, Turbidity

Initial level: TDS (9080), TSS (434), COD (3800), Turbidity (1040) NTU

Desired level: TDS (<500), TSS (<30), COD (<1000), Turbidity (<1) NTU

Achieved level: TDS (148), TSS (0), COD (350), Turbidity (0.09) NTU

River Water:

Contaminants of concern: Silt, BOD, TSS, N, Turbidity

Initial level: Silt (1.8%), TDS (580), Turbidity (4370) NTU

Desired level: Silt (<0.01), TSS (<50), Turbidity (<1) NTU

Achieved level: Silt (0), TSS (0), TDS (24), Turbidity (0.06) NTU

We believe we offer the best in its class of mining wastewater treatment technology in the world today able to treat mine water, and further mine remediation with significant cost savings. It provides a sustainable solution for addressing the nation's 22,000 plus contaminated mine sites in the State of Colorado alone. Mining waste present a national security challenge that threatens the lives and well being of our citizens and future generation.

Sincerely,

George T. Frambo, MBA

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